CLAIMS

1. A high-frequency plasma generating apparatus having a reaction chamber in which a ground electrode is disposed and a discharge electrode is disposed opposite to the ground electrode, so that a substrate as a processing object will be placed in close contact with the ground electrode, and a high-frequency voltage will be applied to the discharge electrode so as to generate plasma between the ground electrode and the discharge electrode,

the high-frequency plasma generating apparatus comprising:

a first high-frequency generator which generates a first high-frequency voltage,

a first electric power feeder which applies the first high-frequency voltage to a feeding point disposed on a lateral portion of the discharge electrode,

a second high-frequency generator which generates a second high-frequency voltage, and

a second electric power feeder which applies the second high-frequency voltage to a feeding point disposed on another lateral portion of the discharge electrode,

wherein the second high-frequency voltage has the same frequency as that of the first high-frequency voltage and has a phase which varies with a low-frequency signal, which is modulated by a predetermined modulation signal.

2. A high-frequency plasma generating apparatus having a reaction chamber in which a ground electrode is disposed and a discharge electrode is disposed opposite to the ground electrode, so that a substrate as a processing object will be placed in close contact with the ground electrode, and a high-frequency voltage will be applied to the discharge electrode so as to generate plasma between the ground electrode and the discharge electrode,

the high-frequency plasma generating apparatus comprising:

a high-frequency oscillator which generates a high-frequency signal,

a first high-frequency generator which amplifies the high-frequency signal from the high-frequency oscillator to yield a first high-frequency voltage, and which outputs the first high-frequency voltage,

a first electric power feeder which applies the first high-frequency voltage to a feeding point disposed on a lateral portion of the discharge electrode,

a low-frequency oscillator which generates a low-frequency signal which is modulated by a predetermined modulation signal,

a phase modulator which modulates the phase of the high-frequency signal from the high-frequency oscillator with the low-frequency signal,

a second high-frequency generator which amplifies the high-frequency signal modulated by the phase modulator to

yield a second high-frequency voltage, and which outputs the second high-frequency voltage, and

a second electric power feeder which applies the second high-frequency voltage to a feeding point disposed on another lateral portion of the discharge electrode.

3. A high-frequency plasma generating apparatus according to claim 1 or 2, wherein the discharge electrode is a ladder-shaped electrode formed by disposing a plurality of longitudinal electrode rods between two transverse electrode rods, and the feeding point is disposed on the transverse electrode rods.

4. A high-frequency plasma generating process in which a substrate as a processing object is placed in close contact with a ground electrode, which is disposed in a reaction chamber in which a discharge electrode is disposed opposite to the ground electrode, and a high-frequency voltage is applied to the discharge electrode so as to generate plasma between the ground electrode and the discharge electrode,

the high-frequency plasma generating process comprising:

applying a first high-frequency voltage to a feeding point disposed on a lateral portion of the discharge electrode, and

applying a second high-frequency voltage to a feeding point disposed on another lateral portion of the discharge electrode, the second high-frequency voltage having the same

frequency as that of the first high-frequency voltage and having a phase which varies with a low-frequency signal, which is modulated by a predetermined modulation signal.

5. A process for cleaning a high-frequency plasma generating apparatus having a reaction chamber in which a ground electrode is disposed and a discharge electrode is disposed opposite to the ground electrode, so that a substrate as a processing object will be placed in close contact with the ground electrode, and a high-frequency voltage will be applied to the discharge electrode so as to generate plasma between the ground electrode and the discharge electrode,

the process for cleaning the high-frequency plasma generating apparatus comprising:

introducing a halogen compound such as NF_3, CF_4, CCL_4, SF_6 into the reaction chamber,

applying a first high-frequency voltage to a feeding point disposed on a lateral portion of the discharge electrode, and

applying a second high-frequency voltage to a feeding point disposed on another lateral portion of the discharge electrode, the second high-frequency voltage having the same frequency as that of the first high-frequency voltage and having a phase which varies with a low-frequency signal, which is modulated by a predetermined modulation signal.